Watervliet Arsenal Fuel Cell Demonstration program

MEETING DEMAND: Plug Power's installation and operation of 10 5kW proton exchange membrane (PEM) fuel cell systems at the Watervliet Arsenal, Watervliet, N.Y., throughout 2002 provides further assessment and validation of fuel cell technology in support of sustainable military facilities.

CUSTOMER: U.S. Army Engineer Research and Development Center, Construction Engineering Research Laboratory (ERDC-CERL)

The U.S. Army Corps of Engineers' Construction Engineering Research Laboratory is one of seven laboratories of the Engineer Research and Development Center. The U.S. Army Corps of Engineers' Construction Engineering Research Laboratory conducts research to support sustainable military installations and works closely with Department of Defense customers to develop products and services to help them implement new technologies. This forward-looking organization recognizes the potential impact of PEM fuel cell technology and initiated this program as a follow-up to a successful phosphoric acid fuel cell demonstration in the 1990s.

The partnership between the Engineer Research and Development Center and Plug Power emphasizes the continued learning from real world installations that is driving fuel cell commercialization. In order to demonstrate the versatility of fuel cell systems, 10 Plug Power GenSys™5C fuel cell systems were installed in support of residential and operational facilities at the Watervliet Arsenal complex in 2002.

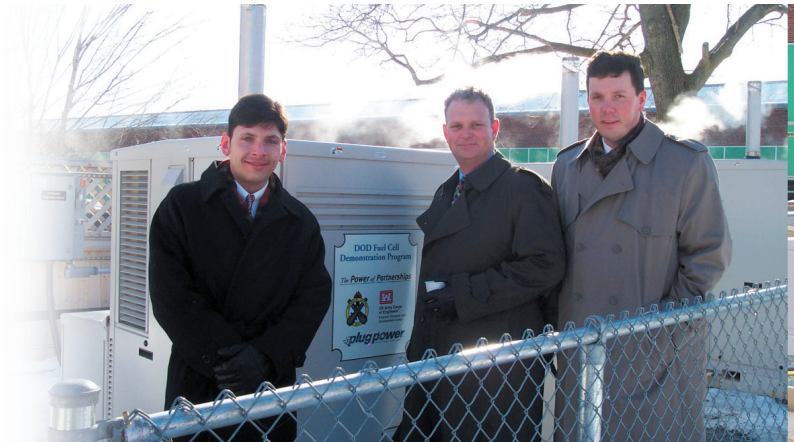
Plug Power worked collaboratively with the Engineer Research and Development Center and Watervliet Arsenal personnel to identify three appropriate base sites for the demonstration. Each site was selected to match the power output of the fuel cell systems with the electrical demand of the facility supported. When site preparation was complete, Plug Power provided one-day turn around for fuel cell shipment, installation and commissioning.

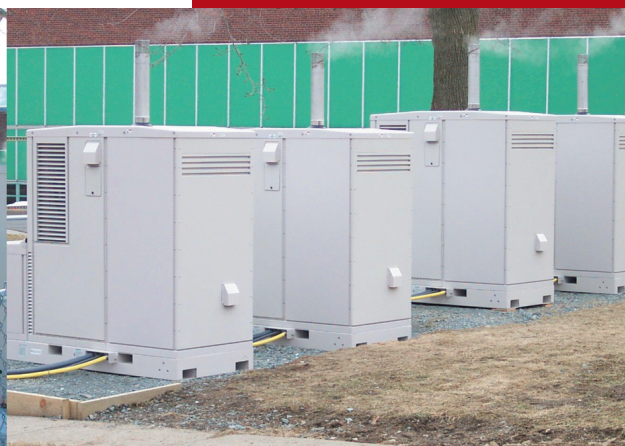
CUSTOMER:
U.S. Army Engineer Research and Development Center, Construction Engineering Research Laboratory (ERDC-CERL)

NEEDS:
- Increase the Army's ability to more efficiently construct, operate and maintain its facilities.
- Assess the role of PEM fuel cells in supporting the Army's training, readiness, mobilization and sustainability missions.
- Provide a demonstration site for military base market.
- Provide operational testing and validation of fuel cell technology to assess installation, grid interconnection, operation of systems in all seasonal conditions, and integration of units into an existing military base environment.

BENEFITS:
- Demonstrate the operational characteristics of Plug Power's fuel cell systems, including reliability and system efficiency.
- Provide a platform to increase market penetration by early adopters of fuel cell technology.
- Complement the Department of Defense and the Engineer Research and Development Center's commitment to the development of clean energy technologies.

PRODUCT:
GenSys 5C™





PROJECT COMPLETED

Site preparation included all foundation work, gas piping, water system installation, electrical interconnection and communications wiring. Systems were shipped, installed and commissioned in the following locations throughout the base:

- 4 fuel cell systems supported the Officers' Quarters, an historic building at the Arsenal that has been converted to house four families. One fuel cell system was provided per housing unit.
- 3 fuel cell systems supported the Arsenal's telecommunications equipment.
- 3 fuel cell systems supported the destructive-testing laboratory located at Building 115 a research facility, at the site.

The fuel cell systems operated at or above 94 percent average availability during 2002, exceeding the contract requirement of 90 percent. *"System performance over the year was monitored for power generated, electrical efficiency and system availability,"* said Mark A. Sperry, Plug Power Chief Marketing Officer. *"This fleet not only surpassed our performance objectives but provided an excellent educational opportunity for our staff that will be used to continually improve our product for future customers."*

"This program was significant because it represented the largest implementation of PEM fuel cells at a military facility," said Frank Holcomb, Principal Investigator, U.S. Army Engineer Research and Development Center, and program sponsor. *"The learning to industry and the military has been very high, and programs like this continue to move this technology closer to wide-spread commercialization. We look forward to continuing to explore how other military bases can benefit from fuel cell technology."*

The operating period of the contract ended Jan. 21, 2003. Several fuel cell systems were operated, beyond the Engineer Research and Development Center's contract terms, under agreement between the Watervliet Arsenal and Plug Power.

Over the course of the yearlong demonstration, the 10 fuel cell systems operated more than 80,000 hours and produced 214,555 kWh of electricity. The data and learning garnered from this fleet has had a positive impact on system life, reliability, failure mode analysis, and service and customer support practices.

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